

Appl. No. 10/719,971  
Response Dated March 27, 2006  
Reply to Office action of January 30, 2006

132669-1

### Claims Listing

1. (Presently amended) A miniaturized sensor device, comprising:
  - a thin film membrane having a first surface and a second surface;
  - one or more resistive thin film heater/thermometer devices disposed directly or indirectly adjacent to at least one of the first surface of the thin film membrane and the second surface of the thin film membrane;
  - a frame disposed directly or indirectly adjacent to the second surface of the thin film membrane, wherein one or more internal surfaces of the frame define at least one cell having at least one opening;
  - a thin film layer disposed directly or indirectly adjacent to the frame; and
  - a sensing layer disposed directly or indirectly adjacent to the thin film membrane, said sensing layer comprising a plurality of nano-scale particles and a plurality of nanopores, wherein said sensing layer serves as an interface between the sensor device and a substance being sensed.
2. (Original) The sensor device of claim 1, wherein the thin film membrane comprises a material selected from the group consisting of at least one dielectric material, polysilicon, and a combination of at least one of the foregoing materials.
3. (Original) The sensor device of claim 2, wherein the at least one dielectric material comprises a material selected from the group consisting of silicon, silicon oxinitride, parylene, polyimide, and a combination of at least one of the foregoing materials.
4. (Original) The sensor device of claim 1, wherein the thin film membrane has a thickness of between about 50 nm and about 5 microns.

Appl. No. 10/719,971  
Response Dated March 27, 2006  
Reply to Office action of January 30, 2006

132669-1

5. (Original) The sensor device of claim 1, wherein the one or more resistive thin film heater/thermometer devices each comprise a material selected from the group consisting of at least one metal, polysilicon, heavily-doped silicon, silicon carbide, and a combination of at least one of the foregoing materials.
6. (Original) The sensor device of claim 5, wherein the at least one metal comprises at least one of platinum, titanium, gold, chromium, nickel, copper, and aluminum.
7. (Original) The sensor device of claim 1, wherein each of the one or more resistive thin film heater/thermometer devices has a thickness of between about 1 nm and about 50 microns.
8. (Original) The sensor device of claim 1, wherein the frame comprises a silicon frame.
9. (Original) The sensor device of claim 1, wherein the frame has a thickness of between about 50 microns and about 650 microns.
10. (Original) The sensor device of claim 1, wherein the thin film layer comprises a material selected from the group consisting of at least one dielectric material, polysilicon, parylene, polyimide, silicon oxinitride, and a combination of at least one of the foregoing materials.
11. (Original) The sensor device of claim 1, wherein the thin film layer has a thickness of between about 50 nm and about 5 microns.
12. (Original) The sensor device of claim 1, wherein the sensing layer is disposed directly or indirectly adjacent to the first surface of the thin film membrane.
13. (Original) The sensor device of claim 1, wherein the sensing layer is disposed directly or indirectly adjacent to the second surface of the thin film membrane.
14. Presently canceled.

Appl. No. 10/719,971  
Response Dated March 27, 2006  
Reply to Office action of January 30, 2006

132669-1

15. (Presently amended) The sensor device of claim [14] 1, wherein the plurality of nano-scale particles comprises at least one of a plurality of nano-scale spheres, a plurality of nano-scale rods, and a plurality of nano-scale hollow fibers.

16. (Original) The sensor device of claim 1, wherein the sensing layer comprises a material selected from the group consisting of zeolite, a cross-linked organic polyelectrolyte, a self-assembled monolayer of ionic character, an aluminosilicate, a carbon nanostructure, and a combination of at least one of the foregoing materials.

17. (Original) The sensor device of claim 1, wherein the sensing layer has a thickness of between about 1 nm and about 5 microns.

18. (Original) The sensor device of claim 1, further comprising:

an additional thin film membrane disposed directly or indirectly adjacent to the thin film layer;

an additional frame disposed directly or indirectly adjacent to the additional thin film membrane, wherein one or more internal surfaces of the additional frame define at least one additional cell having at least two additional openings;

a porous grid structure disposed substantially within at least one of the two additional openings of the at least one additional cell defined by the one or more internal surfaces of the additional frame; and

an additional thin film layer disposed directly or indirectly adjacent to the additional frame.

19. (Original) The sensor device of claim 18, wherein the additional thin film membrane comprises a material selected from the group consisting of at least one dielectric material, polysilicon, and a combination of at least one of the foregoing materials.

Appl. No. 10/719,971  
Response Dated March 27, 2006  
Reply to Office action of January 30, 2006

132669-1

20. (Original) The sensor device of claim 19, wherein the at least one dielectric material comprises a material selected from the group consisting of silicon, silicon oxinitride, parylene, polyimide, and a combination of at least one of the foregoing materials.
21. (Original) The sensor device of claim 18, wherein the additional thin film membrane has a thickness of between about 50 nm and about 5 microns.
22. (Original) The sensor device of claim 18, wherein the additional frame comprises an additional silicon frame.
23. (Original) The sensor device of claim 18, wherein the additional frame has a thickness of between about 50 microns and about 650 microns.
24. (Original) The sensor device of claim 18, wherein the additional thin film layer comprises a material selected from the group consisting of at least one dielectric material, polysilicon, parylene, polyimide, silicon oxinitride, and a combination of at least one of the foregoing materials.
25. (Original) The sensor device of claim 18, wherein the additional thin film layer has a thickness of between about 50 nm and about 5 microns.
26. (Original) The sensor device of claim 1, wherein at least a portion of the sensor device is substantially surrounded by an atmosphere comprising one of dry air and an inert gas.
27. - 80. Previously canceled.